

The Feature of AR Maintenance Re-Coat

AR Maintenance Re-Coat・ Only for Solar Panel

Ingredient

- ①SiO₂ (Silica).....Improved transmittance
Super Hydrophilic & inorganic adhesion binder function
- ②SnO₂ (Tin Oxide).....Anti-Static function
- ③WO₃ (Tungsten oxide) ... Photocatalyst, Chemical resistance,
Hard coat property
- ④Pt (Platinum)..... chemical resistance ・hard coat
- ⑤Methanol & Water

1, Improved transmittance by 2-3%
(High transparency and low refraction)

2, Room temperature curing & quick drying

3, Hard Coat film and Chemical resistance

4, Anti-Static function

5, Super Hydrophilic Self-Cleaning function

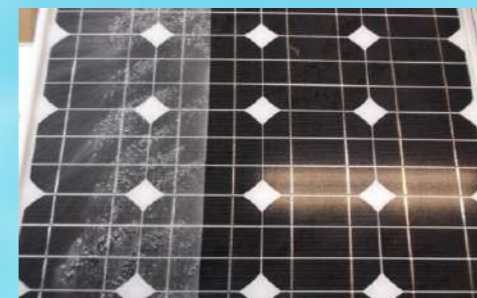
6, Photocatalyst function

First year
6.03% Annual average

Second year
5.64% Annual average

Date	Difference in power generation efficiency (%)
Oct, 2017	2.89%
Nov, 2017	8.83%
Dec, 2017	17.75%
Jan, 2018	10.85%
Feb, 2018	12.9%
Mar, 2018	5.97%
April, 2018	3.23%
May, 2018	1.26%
June, 2018	2.7%
July, 2018	2.56%
Aug, 2018	2.2%
Sep, 2018	1.25%

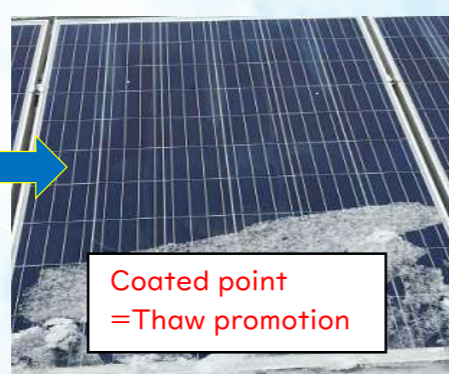
Date	Difference in power generation efficiency (%)
Oct, 2018	4.61%
Nov, 2018	10.83%
Dec, 2018	7.37%
Jan, 2019	13.53%
Feb, 2019	5.16%
Mar, 2019	6.03%
April, 2019	5.04%
May, 2019	5.54%
June, 2019	4%
July, 2019	1.81%
Aug, 2019	2.63%
Sep, 2019	1.2%



◆ Snow removal promotion effect in Xuzhou, China

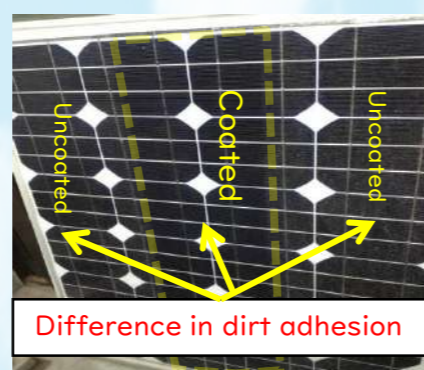


Uncoated point
= Snow covered



Coated point
=Thaw promotion

◆ 1 year later in Japan



Difference in dirt adhesion

Improved
AR2%

Anti
Static

Super
Hydrophilic

Photocatalyst

Snow
removal

Room
Temperature
curing

For Solar Panel, **AR Maintenance Re-Coat**

Anti-Reflection & Anti-Static & Super Hydrophilic Self-Cleaning Coat

Contact



Sketch Co.,Ltd.(coating manufacture)
Chakopaper 3F, 2-25-10 Asakusabashi, Taitoku, Tokyo,
Japan 〒111-0053
TEL +81-3-5825-6503 FAX:+81-3-5825-6504
URL: <https://www.sketch-english.com/>
Mail: info@sketch.co.jp



Did you know that the current AR coating has a reduced transmittance over time, and Furthermore, it becomes easy to get dirty, leading to reduce power generation efficiency?

Problems and solutions for AR coating (Anti-Reflection Coat)

AR coating is a coating solution that increases glass transmittance for solar panels. Mainly SiO₂ is used, and the transmittance increases by around 5%. Currently, the world's number one PV panel production is made in China, and the AR coating made in China is applied at the time of PV panel manufacturing. However, since the second year, the transmittance has been reduced and the power generation efficiency has been reduced. It has been a big problem around the world now.

First generation of AR coat; 2010-2013

AR coating using SiO₂ (silica) of 20nm size. Dirt adherence reduces transmittance, and tiny pinholes(very small hole) can cause a further decrease in transmittance.

Second generation of AR coat; 2014-2019

AR coating using hollow silica obtained by baking and foaming SiO₂ from 550 °C to 600 °C. Currently, the mainstream Chinese AR coat costs about 12 yen per square meter, and the quality is poor. Due to the variation in the particle size of hollow foamed silica, the quality is not constant, and a pinhole opens after 2 years, causing dust to adhere to it, further reducing the transmittance. Initially, AR Coat manufactured by German company or Japanese company were good quality and had no pinholes for more than 20 years. There is a history of withdrawal from the market because the coating agent made in Japan and Germany cannot compete with the Chinese AR coating of less than 12m² per sqm. For this reason, the AR coating made in China, which has been used all over the world, has been adopted at a low cost, and the transmittance decreases from the second year onwards. As time passes, the amount of dust attached increases, causing a significant decrease in power generation efficiency.

The third generation of AR coat; from 2020 onward (solving aftermarket problems after installation)

AR Maintenance Re-coat developed by Sketch in the PV maintenance market is the world's first multifunctional coating solution.

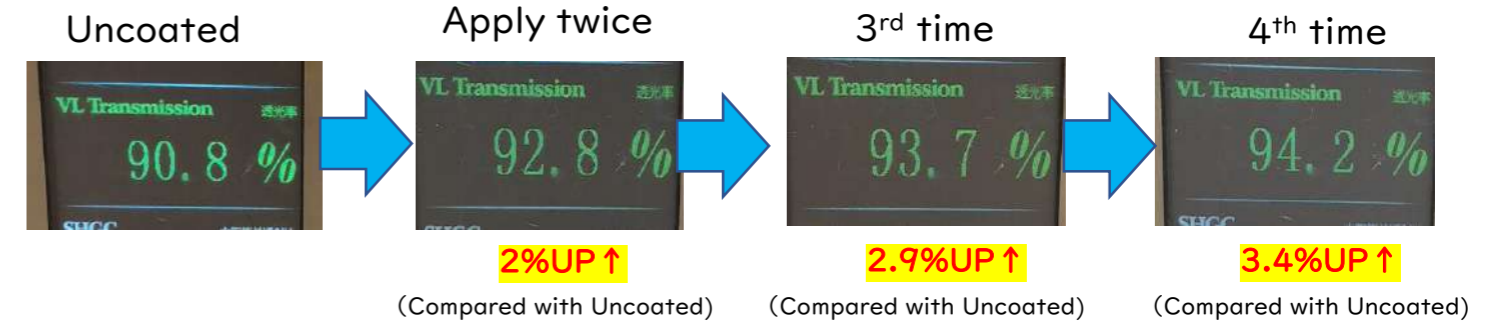
It has an AR of 2% or more, room temperature curing, antistatic function, super hydrophilic function, chemical resistance, hard coat function, and overcoat AR rate increasing function.

Currently, we have partnered with a developer of a machine that can automatically clean solar panels. and are developing a coating robot that can automatically coat solar panels after they have been cleaned. A system that automatically performs cleaning and coating by machine will be a big business that is attracting worldwide attention. There are two types of AR recoats developed by Sketch.

①**AR Maintenance Re-Coat**; AR maintenance recoat using WO₃ and platinum to improve chemical resistance, hard coat properties, anti-static and super hydrophilic function. Even if it is overcoated 5 times or more, the transmittance does not decrease, and it is increased by 2% or more. This product is ideal for the aftermarket. A machine for coating before installation is also under development

②**AR Re-Coat** ; Coating solution with anti-static and super-hydrophilic function by using 100nm size hollow silica with stable quality made in China and adding it to sketch inorganic adhesive binder. The PV panel after installation can be coated as well as the pre-installation construction, and the transmittance can be improved by 3% or more.

AR Maintenance Re-Coat transmittance increase verification



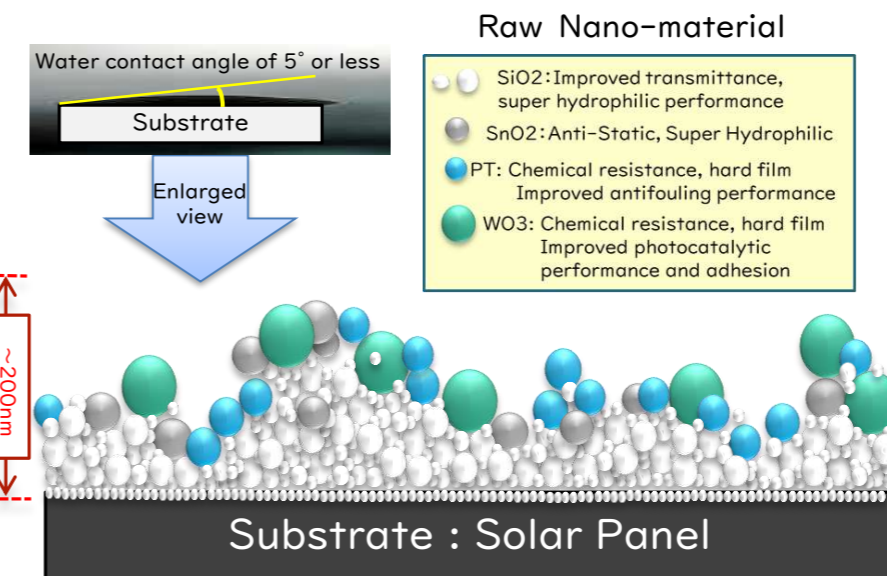
Even if it recoats, VLT doesn't decrease

What is Anti-Static, Super-hydrophilic Self-Cleaning Coat?

For solar panels, nano-sized silica and tin oxide, WO₃, Pt are used, and anti-static function makes it difficult to get dirt like yellow sand and carbon, and the attached dirt is self-cleaning with super hydrophilic function. Furthermore, it is the world's first 100% inorganic nano-coat material with improved transmittance.

※What is fractal theory?

The theory that the effect of hydrophilicity becomes stronger due to fine irregularities on the surface. If the unevenness is evenly arranged, it becomes super water-repellent, and if it is unevenly arranged, it becomes super-hydrophilic. We have succeeded in creating irregularities with a film thickness of 200 nanometers or less by using several types of nano-silica and single nanomaterials. As a result, a super-hydrophilic film is always formed without photocatalytic function. Substrates such as glass, polycarbonate, and stainless steel appear flat on the surface, but in fact, there are fine irregularities that are not visible. Therefore, by using our binder technology, it is possible to adhere to various materials by controlling silica and tin oxide of various sizes from 2nm to 10nm. In addition, since silica with a very small particle size is used, the photocatalyst and antistatic nanomaterial can be brought out on the surface, so that the function can be performed very efficiently.



Three main functions of antistatic super hydrophilic self-cleaning coat

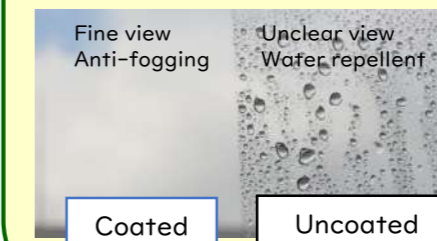
Anti-static

Static electricity is hardly generated from the substrate, yellow sand and dust will hardly be adhered.



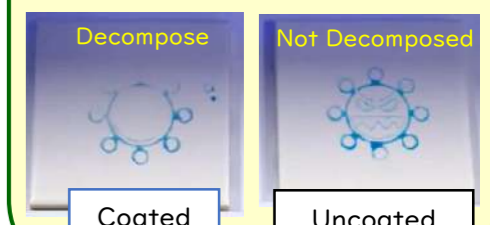
Super Hydrophilic

Unlike the super-hydrophilic function by a chemical reaction of the photo catalyst, the binder has an uneven surface. Even if there is no light it will form a super-hydrophilic film



Photocatalyst

About titanium oxide, each manufacturer has a difference of decomposition effect by the photo catalyst . we could introduce a good nano material.



AR Maintenance recoat solves the above problem

Improved AR2%

Anti Static

Super Hydrophilic

Photocatalyst

Snow removal

Room Temperature curing

◆ AR Maintenance Re-Coat

Substrate: Solar Panel

Durability: 10 years or more

Function: • Improved AR2~3%

- Prevents power generation efficiency from decreasing due to dirt
- De-icing promotion effect during snow cover
- Reduction in cleaning maintenance frequency and cost

